Oh My Broken Back: Essentials of Spine Trauma Care

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Disclosures

I have no relevant financial relationships to disclose

Key Concepts

Spinal trauma common with changing demographics

Evaluation critical component of trauma assessment

Remarkably little progress in outcomes over decades

Annual costs (US) \$9.7 billion



Individual lifetime costs >%2 million

	Average) (in 20	/early Expenses 15 dollars)	Estimated Lifetime Costs by Age At Injury (discounted at 2%)			
Severity of Injury	First Year	Each Subsequent Year	25 years old	50 years old		
High Tetraplegia (C1–C4) AIS ABC	\$1,065,980	\$185,111	\$4,729,788	\$2,599,411		
Low Tetraplegia (C5–C8) AIS ABC	\$770,264	\$113,557	\$3 455 879	\$2,125,674		
Paraplegia AIS ABC	\$519,520	\$68,821	\$2,312,846	\$1,517,851		
Motor Functional at Any Level AIS D	\$347,896	\$42,256	\$1,580,148	\$1,115,312		

Males> Females 4:1

Falls > MVA > Violence > Other

10-25% associated spinal cord injury (SCI)



Incidence: 15-30/million

 $\frac{1}{4}$ of all traumas

75+% associated head injury

Mean age increasing (from 20s now 40s)

Cervical: 30% Thoracic: 20% Lumbo-sacral: 50% Multiple 20-25%



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Err on side of immobilization in the field

- Extraction Collar
 - Board/straps



Special Considerations Pool (drowning) Hazard/sensitive skin



<2000 moses/y@lafioSecencere

contracted or sity of excitor

Still no consistent recommendations on how/when/clearance Ongoing debate as long as I can remember

Litigation drives extreme caution



How does change in epidemiology impact evaluation? Osteoporosis and falls



Imaging of entire spine most common Reconstructions increasing used Plain x-rays all but abandoned





Optimal Evaluation: For Your Consideration

- Cranial CT
- cervical CT
- CTA Abd
- Abd/pelvis
- Thoracic CT
- Lumbar CT
- Total (min)

\$1,250

- \$1,130
- \$1,569
- \$2,570
- \$1,447
- \$1,475
- \$8,138

Optimal Evaluation: For Your Consideration

- Cranial CT
- Cervical CT
- CTA Abd
- Abd/pelvis
- Thoracic CT
- Lumbar CT

3mSv 6mSv

- 7mSv
- 10mSv
- 14mSv
- 12mSv
- Total (min) 52mSv*

*mSv: Absorbed dose, cancer risk increased >100 mSv "Natural:" 10 mSv=3 yrs/7 mSv=2 yrs

Spinal Evaluation

Is there?

Fracture* Instability* Spinal Cord Injury*

*Each has various "systems"



Spinal Evaluation

Is there?

Risk of vascular injury

Need CTA/MRA





Spine Intervention

Emergency surgery very rare

Traction for misalignment/stabilization has role

Urgent surgery increasingly common



Spine Intervention

Surgical stabilization

Anesthetic considerations

Mobilization



Spine Intervention

Central Cord Syndrome

Age huge factor

Controversial timing



Special Considerations

Airway/oxygenation (C5)

Spinal Shock

MAP (> 80)



CHARACTERISTIC OF SPINAL SHOCK

- Motor Effects Paraplegia ,Quadriplegia
- Loss of tone -Muscles become flaccid
- Areflexia All superficial and deep reflexes are lost
- Sensory Effects -All Sensations are lost below the level of transection
- Complete lesions above Ti will eliminate all sympathetic outflow.
- Lesions between Ti and T6 will preserve sympathetic tone in head and upper extremities but deny it to the adrenals and lower extremities.
- Lesions between T6 and the lumbar cord will preserve adrenal innervation but denervate the lower extremities.

Special Considerations: Sports Injuries

>10% cervical injuries

Rising dramatically

10x Male





Special Considerations: Sports Injuries

Age 0-15: 25% Age 16-30: 14%

10-15% all football players

"Stinger"





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Fractures Little consensus on treatment Minimal data on outcomes Age key factor

Fractures, Collars, and X-rays

Err on side of ongoing immobilization (collars versus ...)

Typically use 24/7



Miami- J Collar



Aspen Collar



Philadelphia Collar

Fractures, Collars, and X-rays

Follow with sequential imaging/clinical signs

Role of flexion/extension



Fractures, Collars, and X-rays

Type 2 Dens fractures

Rarely fuse Stable pseudoarthrosis



C6-7 is level of independence

C4-5 level respiratory key



Segmental Spinal Cord Level and Function					
Level	Function				
C1-C6	Neck flexors				
C1-T1	Neck extensors				
C3-CS	Supply diaphragm (mostly C4)				
C5-C6	Shoulder movement, raise arm, flex elbow, supinates arm				
C6-C7	Extends elbow and wrist, pronates wrist				
C7-T1	Flexes wrist, supply small muscles of the hand				
T1-T6	Intercostals and trunk above waist				
17-11	Abdominal muscles				
L1-L4	Thigh, hip muscles,				
14-51	Hamstrings and dorsiflexion of foot				
L4-52	Plantar flexion of foot and toe movement				

Improvement seen over 2 years

"Meaningful recovery" from Asia A (complete)

80-90% Asia A remain complete 3-6% regain functional strength

Thoracic fractures can become independent and have many career options

Lumbar Fractures even better prognosis

Bowel and bladder still issue

Urinary and skin conditions cause frequent readmissions

First year readmissions high (1/3 with LOS >20 days)

Overall Mortality Higher than Agematched

Life expectancy (years) for post-injury by severity of injury and age at injury													
		For persons who survive the first 24 hours						For persons surviving at least 1 year post-injury					
		AIS D—Motor		Low	High	Ventilato	Г	AIS D—Motor		Low	High	Ventilator	
Age at		Functional at		Tetra	Tetra	Depende	nt	Functional at		Tetra	Tetra	Dependent-	
Injury	No SCI	Any Level	Para	(C5–C8)	(C1–C4)	Apulay	el	Any Level	Para	(C5–C8)	(C1–C4)	Anglevel	
20	59.5	52.6	45.1	40.0	35.7	19.3		52.9	45.5	40.7	36.9	25.3	
40	40.6	34.2	27.7	23.5	20.1	8.9		34.5	28.1	24.1	21.0	12.6	
60	23.1	17.9	13.1	10.3	8.1	2.2		18.2	13.4	10.6	8.7	4.0	

Prevention Efforts

ThinkFirst (feet first) Seatbelts Bike helmets Proper sports coaching Fall precautions



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